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(71) Applicant: 390012612
SANYO Electric Co., Ltd.
100-1, Sakado, Takatsu-ku, Kawasaki-shi, KANAGAWA
(72) Inventor: Kiyoshi INOUE
c/o SANYO Electric Co., Ltd.
3-16-7, Kamiyoga, Setagaya-ku, Tokyo
(74) Agent: Patent Attorney: Syotaro MOGAMI

(54) [Title of the Invention] Plasma Processing method

(57) [ABSTRACT]

[Object] To provide a novel low-cost plasma processing method which particularly includes simple steps, does not require a large amount of cleaning solution for the processing, and is secure from pollution.

[Constitution] Linear electrodes, needle electrodes, or the like are used to be opposed to substrates in a small dust-free chamber, the relative position between the two is subjected to two-dimensional or three dimensional NC control, and plasma limited to a micro region is generated by applying a high voltage while supplying a processing gas between the electrodes and the substrates, in order to be able to carry out processing such as removal, diffusion, or

precipitation of substances on the substrate surface with the use of the plasma.

[Advantageous Effect] The very simple apparatus allows the surface of, for example, various materials such as semiconductors, insulators such as ceramics, ferromagnets, high magnetic permeability materials, permanent magnet materials, and metals to be subjected to processing such as diffusion, deposition, sintering, and thin film formation by utilizing plasma.

[Scope of Claims]

[Claim 1] A plasma processing method in which an electrode and an object to be processed are opposed to each other, a voltage is applied between the both to generate plasma, the plasma is used to apply desired processing to the object to be process, characterized in that a narrow-line electrode or an electrode with a sharp pinpoint or a sharp edge is used as the electrode, the narrow-line electrode or the pinpoint or edge of the electrode is opposed to a site to be processed of the object to be processed with a small distance therebetween, a high voltage is applied between the electrode and the object to be processed to generate local plasma, while supplying desired processing gas to the opposed site and carrying out numerical control the relative position between the electrode and the object to be processed, the local plasma is brought into contact with the object to be processed to apply the desired processing.

[Claim 2] The processing method according to claim 1, wherein the plasma processing is carried out in a magnetic field.

[Claim 3] The processing method according to claim 2, wherein a magnetic material is used as the electrode, and the processing is carried out in a magnetic field generated at the tip of the electrode via the electrode.

[Claim 4] The processing method according to any one of claims 1 to 3, wherein the processing is carried out while controlling a processing ion current to a desired value.

[Claim 5] The processing method according to any one of claims 1 to 4, wherein thermal energy processing is also used in combination with plasma.

[Claim 6] The processing method according to any one of claims 1 to 5, wherein a processing gas is used which is composed of a gas including at lease one atom selected from the group consisting of F, B, P, As, Ga, Cu, Ni, Pt, Au, and O and of a carrier gas unreactive with the object to be processed.

[Claim 7] The processing method according to claim 6, wherein the carrier gas is hydrogen.

[Claim 8] The processing method according to claim 6, wherein the carrier gas is an

inert gas.

[Detailed Description of the Invention]

[0001] The present invention relates to various types of microfabrication methods using plasma, for example, a method for applying processing such as diffusion, deposition, sintering, and thin film formation, to various materials such as semiconductors, insulators such as ceramics, ferromagnets, high magnetic permeability materials, permanent magnet materials, and metals, and a novel low-cost plasma processing method which particularly includes simple steps, does not require a large amount of cleaning solution for the processing, and is secure from pollution.

[0002] Conventionally, this type of processing is carried out in a large-scale decompression chamber, and involves a wide variety of process steps, which require a large amount of cleaning solution for each step. To give processing of silicon LSI as an example, first, a desired pattern is optically transferred precisely to a resist film coating on a substrate, either the nonphotosensitive portion or the sensitive portion is then removed by dissolving, a plasma-resistant image is formed on the resist film surface, the portion with less resistance to plasma is removed by plasma, deposition or diffusion processing is partially applied, if necessary, and an oxide layer for surface protection and electrical insulation is then formed to provide electrical isolation.

[0003] In this process, products are subjected to processing (removal, diffusion, deposition processing) one by one in a parallel and analog manner, while repeating cleaning for each step. More specifically, in order to manufacture a substrate, a single crystal as a material is sliced with an ID cutter, wrapped in a cutting fluid, and further subjected to etching, while cleaning processing is repeated before or after each step. Further, since these steps are carried out in a clean room, a large high-performance filter is required, through which a large deal of energy is consumed for circulating a large amount of air.

[0004] Moreover, for the purpose of cleaning, environmentally harmful chlorofluorocarbon is used, or alternatively, even in the case of using water, a large amount of high-grade pure water on the order of 1 MΩcm is required. Thus, the water treatment uses a fairly large deal of energy and highly pollution-triggered hazardous drugs.

[0005] Furthermore, the apparatuses for use in this processing also require substantially high precisions. However, the use of apparatuses in a series manner results in sequential accumulation of errors for each step. Therefore, it is eventually difficult to obtain the desired precisions.

[0006] For example, the surfaces of these semiconductor substrates are required to have flatness on the order of nm locally, and on the order of 0.1 μm for the entire substrate. However, current methods all have limits on the order of μm. If higher precisions are required, the cost will be dramatically increased, which will make it impossible to supply an enormous amount of products at practical cost. Thus, this order is employed. In particular, in the case of multiply-stacked LSI, the precision is problematic, and methods for completely solving this problem with the precision have not been proposed so far.

[0007] The present invention has been made in order to solve the above-mentioned problem, and according to the present invention, metals, ceramics, semiconductors, plastics, and other materials can be optionally processed by optionally using ions and radicals with a minimum number of cleaning steps in accordance with a quite simple process.

[0008] With the use of ions, multivalent ions, or mixed ions for rough processing, or of radicals for microfabrication, a cyclotron effect generated by jet of the processing gas and a magnetic field is utilized to carry out plasma processing. In each case, the site and range to be processed is precisely controlled, thereby allowing processing with high precision, and further optional processing such as precipitation with ion discharge or diffusion of the precipitation into the inside of a substrate. Conventionally, in such processing (removal, precipitation, diffusion), the substrate materials have required a wide variety of complex steps.

[0009] In the present invention, linear electrodes, needle electrodes, or the like are used to be opposed to substrates in a small dust-free chamber, the relative position between the two is subjected to two-dimensional or three dimensional NC control, and plasma limited to a micro region is generated by applying a high voltage while supplying a processing gas between the electrodes and the substrates, in order to carry out processing such as removal, diffusion, or precipitation of substances on the substrate surface with the use of the plasma. It is to be noted that thermal diffusion, electromagnetic radiation diffusion, or the like may be used in combination of the processing with the plasma.

[0010] Thus, the amount of energy required for the processing is measured and controlled with the use of plasma current, generated sound, or the like. This allows NC digital control of the electrode positions because the condition during manufacture can be determined in real time.

[0011] As described above, in the present invention, the relative position between electrodes and objects to be processed controlled while controlling plasma energy with plasma current as

a parameter, and processing such as precipitation, removal diffusion is carried out in a single step.

[0012] As the electrodes, electrodes of various geometries are used such as wire electrodes and needle electrodes. Those electrodes are appropriately combined by an automatic electrode changer depending on the application, and used. In addition, the electrodes are configured such that a processing gas required for the processing is supplied between the tips of electrodes and the object to be processed, in accordance with the purpose of the processing.

[0013] Furthermore, it is recommended to combine means of thermal processing with microwaves, ultrashort waves, pulses, or the like. In high frequency electric field (magnetic field), nuclei or electrons are restrained to cause strain, which can be effectively used for the processing. In general, it is recommended to use a half wave or pulse of 1 μs or less.

[0014] Desired processing is achieved while controlling the position of plasma in such a way that, with microwaves, ultrashort waves, or the like brought in sync with plasma generation, power is supplied to an electrode disposed near a portion to be processed to generate plasma only for a limited portion. It is recommended that the control in this case is acoustically exercised, more specifically, ultrasonic waves generated with the processing are detected and subjected to spectral analysis, and the progress of the processing is determined based on the results to control the plasma voltage and the processing rate.

[0015] In addition, in the case of processing with the use of a pulse voltage, partial plasma is generated near an electrode by a pulsed electromagnetic field, processing is carried out while adequately controlling the plasma energy during the partial plasma generation, while ions and radicals generated by the plasma are utilized.

[0016] Since microwaves, ultrashort waves, pulses all generate reactive ions or radicals in proportional to the power, the measurement of the power allows the amount of processing with the reactive ions or radicals to be obtained. In addition, the amount of processing can be determined by measuring the electron density generated immediately after the processing. Further, from a macroscopic point of view, it is also possible to detect a surface to be processed by detecting reflection of electromagnetic waves.

[0017] In the case of putting the method according to the present invention into practice, it is recommended that halogen plasma is generated with the use of a halide as the processing gas to utilize the high reactivity of the halogen plasma. Further, the mean free path of particles of the plasma composition in the processing atmosphere is controlled to be kept within a

certain definite range, thereby ensuring the control of the effective region for ions, ion clusters, radicals, and radical clusters generated by the plasma.

[0018] Furthermore, in order to control the drift, the relative position between the plasma and an object to be processed is subjected to NC control while controlling the plasma generation energy, and the state of the object being processed is precisely determined by the acoustic means, optical means, electromagnetic means, or the like to obtain a (crystallographically or atomically) cleaned surface on the order of micrometers. This allows for processing of any material, and thus allows for all types of microfabrication with precision.

[0019] Furthermore, in order to focus the plasma on a portion which needs the plasma, it is desirable to utilize the interaction between the magnetic field and the plasma. Therefore, it is recommended that the electrode itself is used as a magnetic pole to carryout cyclotron focusing. Further, the processing can be easily achieved by precisely controlling the plasma current as well as the flow rate of the supplied reactive gas (mainly a halide).

[0020] As described above, in the present embodiment, an electrode with a sharp pinpoint or a sharp edge in a shape such as a line, a plate, or a needle is used to generate plasma over the sharp pinpoint or sharp edge opposed to an object to be processed, and thus lead the plasma to act directly on a surface to be processed, thereby allowing the object to be processed to be subjected to a two-dimensional or three-dimensional molding process.

[0021] When one molecule (including halogen) is decomposed to generate a reactive group near a solid object to be processed, processing is carried out depending on the positional relationship between the reactive group and the object to be processed. Therefore, the processing accuracy is determined depending on the effective region of the plasma. In order to carry out the processing with high accuracy, the reactive group has to be generated within the mean free path L of particles of the plasma composition from the surface of the substrate. The mean free path L is inversely proportional to the pressure as long as the mass and velocity of the particles of the plasma composition are kept constant.

[0022] In the present invention, plasma processing is carried out in such a way that plasma is generated in a microscopic area supplying the processing gas in relatively rough vacuum to reduce the mean free path L of particles of the plasma composition while using a sharp electrode and applying a high voltage, is brought into contact a surface to be processed. For example, when SF_6 is used as the processing gas to process Si, the Si will be removed following $SF_6 + 1.5Si = S + 1.5SF_6$.

[0023] Of course, CF_x can also be used to carry out similar processing. In addition, ion processing can be applied at a higher speed with the voltage increased. Further, one of important features of the present invention is that the average particle density of ions or neutrons in general F plasma is on the order of 10^{16} /m^3, and is thus that the processing proceeds at considerably high speed.

[0024] Further, in an embodiment of the present invention, plasma is generated in a magnetic field, and utilize for processing. Therefore, the electrode or its holder is manufactured from a ferromagnetic or high permeability material, and excited to generate a strong magnetic field in a plasma generation region. Then, when initially emitted electrons collide with ions to generate plasma, the electrons will be subjected to cyclotron effect to circulate for keeping the reaction stable.

[0025] When a magnetic field on the order of 1KG is applied to keep the ion density at 10^{19} to 10^{20} /m^3, the shape and size of the plasma will be precisely maintained, thereby allowing for processing at high speed and with high accuracy. Since the incident angle of ions is small in a portion of the surface to be processed further apart from the ion generating source, the reaction proceeds weakly outside a certain range so that no excess processing proceeds.

[0026] When the incidence energy of ions is appropriately controlled, in accordance with the level thereof, processing for sputtering (deposition) or removal can be carried out, and diffusion or thermal processing can be further carried out. Then, when the incidence energy is precisely controlled, the amount of processing and the amount of removal can be precisely controlled. Thus, in the case where a balance is maintained between the energy supplied to the surface to be processed and the energy emitted therefrom, the processing can proceed without causing any strain in the material at all.

[0027] The gas used for the processing is a mixed gas including: an inert gas such as He or Ar, or H_2 as a carrier gas; and a gas containing at least one atom selected from the group consisting of F, B, P, As, Ga, Cu, Ni, Pt, Au and O, for example, a processing gas such as CF_4, BF_3, NF_3, SF_6, OCl_4, Cl_2F_2, HF, HCl, O_2, or O_3.

[0028] A boron-based gas such as B_2H_6 or BF_3 is used for diffusional processing, and PH_3, AsH_3, BH_6, or the like is used for depositional diffusion. Further, depending on applications, SiH_4, NH_3, SiH_2Cl_2, SO_2H_6, N_2O, NF, tetraisopropoxytitanium, hexafluoroacetyl-acetoneto, $Cu(HFA)_2$, $Cu(PPM)_2$, Cu(ACAC), $Si(OC_2H_5)_4$, and the like are used.

[0029] An apparatus, a method and the like for use in the practice of the present invention will be described below with reference to the drawings. FIG. 1 is a perspective view illustrating

a configuration example of a main part of an apparatus for carrying out a plasma processing method according to the present invention, FIG. 2 is a cross-sectional view illustrating an example of a wire electrode arrangement, FIG. 3 is a cross-sectional view illustrating an example of a pinpoint electrode arrangement, FIG. 4 is an illustration showing a state in which plasma generated around a wire electrode is used to apply scribing to the surface of a semiconductor for polishing, and FIG. 5 is an illustration showing a method for applying grooving processing during the processing step shown in FIG. 4.

[0030] The apparatus shown in FIG. 1 is placed in a clean processing room which is not shown in the figure, together with other accessory apparatuses, that is, an automatic electrode exchanger, a processing gas supplier, a power supply, and the like, the processing room is further provided with an apparatus for discharging and collecting generated gases, an apparatus for loading and unloading objects to be processed, and the like, and the inside of the processing room is filled with a processing gas which has a desired composition, pressure and temperature.

[0031] In the figure, reference numerals 1, 1 denote main girders provided in parallel with the x axis; 2 denotes a cross beam placed on guides 1a, 1a each provided on the pair of main girders 1, 1 and slidable in the x axis; 3 denotes a table placed on a pair of guides 2a, 2a provided on the cross beam 2 and slidable in the y axis; 4, 4 each denote electrode units for elevatingly holding desired electrodes 5, 5; 6,6 denote electrode unit mounting columns provided in an alignment manner on the table 3 to hold the electrode units 5, 5; 7,7 denote object to be processed such as semiconductors; 8 denotes a working table on which the objects to be processed 7, 7 are mounted; 9, 9 denote feed screws for feeding the cross beam 2, 2 in the X axis direction; 10 denotes a feed screw for feeding the table 3 in the Y axis direction; 11 denotes a plummer block for supporting one end of the feed screw 10.

[0032] The pair of main girders 1, 1 are provided on a base provided in the processing room to be opposed to each other in parallel with the X axis. The slide guides 1a, 1a are each provided on the upper surfaces of the main girders 1, 1, with the cross beam 2 mounted on the slide guides 1a, 1a so that the cross beam 2 is fed by the pair of feed screws 9, 9 rotating in synchronization with each other.

[0033] The pair of slide guides 2a, 2a are provided in parallel with the Y axis on the upper surface of the cross beam 2, with the table provided on the pair of slide guides 2a, 2a, so that the table 3 is fed by the feed screw 10 in the Y axis direction. The table 3 has an edge

provided with the plurality of electrode unit mounting columns 6, 6 to which the electrode unit 4, 4 are detachably and elevatingly attached.

[0034] It is to be noted plummer blocks for supporting the feed screws 9, 9, a motor for rotating the plummer blocks, as well as a drive motor for the feed screw 10 and a plummer block on the side of the drive motor, and the like are omitted for the sake of shorthand. Configuration examples of the electrode unit are shown in FIGS. 2 and 3.

[0035] The electrode unit shown in FIG. 2 uses a thin wire electrode. In the figure, .reference numerals 21, 22, and 23 and 24 denote a casing, a wire electrode, and collets for gripping edges of the electrode 22. The casing 21 has a bowl-shaped main body with an opening at the bottom, which is provided with am amounting shank and gas supply line connection 21a and further screw holes for mounting electrode collets 231, 241.

[0036] The mounting shank and gas supply line connection 21a is inserted into a socket provided in the electrode unit mounting column 6 so as to be mechanically held, and connected to the processing gas supply source. The pair of electrode collets 231, 241 are concentrically provided, into which the electrode 22 is inserted, and clamped with collet nuts 232, 242 to hold the electrode 22. Reference numerals 233 and 24 denote clamp nuts for tension.

[0037] In addition, the collet 242 has a hexagon cap nut 24a for clamping and a tapered jack 24b for receiving power, which is configured so that the collet 242 can be connected to the socket provided in the column to receive power when the unit is mounted on the electrode unit mounting column 6.

[0038] The unit shown in FIG. 3 uses a pencil-shaped pinpoint electrode. In the figure, reference numerals 31, 32, 33, 34, 35, 36, 37 and 38, 39, 40, and 41 denote a lower casing, an upper casing, a cap, an electrode, a collet, a socket, springs, a collet operation tube composed of a high-permeability material, an exciting coil, and a socket. The lower casing has an mounting shank and gas supply line connection 31a, and has a hole 31b into which the lower end of a collet 35 is inserted and a plurality of gas blow holes 31c arranged around the hole 31b.

[0039] The collet 35 is operated with the operation tube 39, and the electrode 34 is extruded by a required length if necessary, and has the tip polished by an apparatus which is not shown in the figure. The unit, when mounted on the electrode unit mounting column 6, is connected to a gas source and a power source in the same as for the unit described above. These electrode units are numerously stoked in the electrode exchanger, and appropriately

taken out in accordance with a command from a control computer and mounted on the electrode unit mounting column 6.

[0040] Returning to FIG. 1 again, the feed screws 9 and 10 for feeding the cross beam and the table 3 are rotated to feed the cross beam 2 and the table 3 desirably in accordance with commands from a central control computer, whereas the electrode unit mounting columns 6 moves up or down the electrode units 4, 4 also in accordance with commands from the central control computer, and the central control computer further controls the power for plasma generation, which is to be supplied to the electrode units, the composition and supply of the processing gas, and the power for magnetic field generation, in order to apply desired processing to the objects 7,7 to be processed.

[0041]

[Embodiment] An example of processing with the use of the apparatus described above will be described below. The surface of a Si substrate was subjected to surface removal processing by applying a 3A current 100 MHz with the use of a processing gas containing 4% CF_4 gas per unit volume and Ar gas as the rest, and a 0.3 mmφ piano wire as an electrode to be processed.

[0042] The surface to be processed was square and had a $3cm^2$ area to be processed, the current density was $1A/cm^2$. When the wire electrode was reciprocated at a speed of 1m/min along the surface to be processed, plasma with CF_4H is generated to generate F^-, resulting in removal processing 0.23 mg per minute. This corresponds to the amount of processing of 0.1 mm/min. This processing method can be utilized for perforation processing, grooving processing, and finish processing. Alternatively, when the processing is carried out under similar conditions described above with the processing gas replaced with O_2, an oxide layer can be formed on the surface of a Si substrate.

[0043] Appropriate selection of the composition of the processing gas, the relative position of the electrode to the surface to be processed by plasma, and the control level of the plasma energy allows diffusion processing or deposition of ions or radicals with the use of the apparatus described above, resulting in the same amount of deposition as the removal, and the removed components can be discharged and collected with the carrier gas.

[0044] In general, the deposition processing is carried out at 10 eV or less, the diffusion processing can be carried out on the order of 100 eV or more, and the processing for removal can be carried out on the order of KeV. Thus, desired integrated circuits can be formed on semiconductor substrates by appropriately switching these processing conditions and

continuously carrying out desired processing while automatically changing the electrode appropriately by the automatic electrode exchanger.

[0045] The embodiment carried out while moving the electrode will be further described. It is to be noted that computer simulation compensates insufficient measurements in the experimental result.

[0046] For a Si material with a specific resistance of 10 Ωcm, a material with an edge face subjected to diamond processing to a surface roughness of 1 μRmax was subjected to cleaning with pure water of 18 μΩ, a SiO_2 layer on the order of 30 nm was formed on the 2 surface also for drying, and the Si material was inserted into in a clean pure Ar flow of $0.5/m^3$ or less in the clean processing room, and secured with a side chuck with the use of a moving apparatus to carry out various types of processing. For the piano wire, a 0.5 mmφ purified material (99.99 %) with a tensile strength of $120kg/mm^2$ was used, and moved at 2 m/min.

[0047] This wire was supported on the sides thereof by ruby dice, and tensioned with a tension of 15kg applied. The pressure of the processing gas is controlled to range from 0.9 to 1.2 atm, with the response specific number of the control system made to be 0.3 sec. As the power supply for plasma, a high-frequency power supply from 100 W to 100 MH_2 and a pulsed power supply with a pulse width of 0.2μs to 0.8 μs and a peak voltage of 800 V were used. The pulse recurrence frequency was made to be KH_2, and the total amount of the supply gas was controlled. Furthermore, a blower is provided to discharge used exhaust stream.

[0048] An openable and closable shutter was provided between the gas supply side and the exhaust stream side. Further, a pulse magnetic field generator with 4K0e at a peak current of 30A was used as a magnetic power supply. Furthermore, the flow was detected with the use of ultrasonic waves, the reference gas and the processing gas were separately supplied into several ultrasonic fields with difference intensities and frequencies from each other, their absorption spectra are compared to determine the composition and partial pressure the processing gas in the processing room. In addition, also in the gas supplied into the area of plasma generation, an apparatus was provided for detecting the flow rate by using the Doppler effect of emitted ultrasonic waves.

[0049] The change in plasma current and the ultrasonic waves generated with processing were detected to control the processing gap. Further, in order to allow control of the composition, pressure, flow rate of the supply gas, the supply source for each component gas was provided with a flapper nozzle for flow rate control, which was controlled by the computer.

[0050] FIG. 4 is an illustration showing a state in which plasma generated around a piano wire is used to apply scribing to the surface of a semiconductor for polishing. In a 1000 HP processing gas containing 4.5% CF_4 per unit volume and Ar gas as the rest, a 100 W condenser coupler was controlled to supply power and then generate about 0.1 mm wide plasma around an about 0.5 mmφ piano wire.

[0051] While keeping the gap between the Si substrate and the wire power at 0.05 mm, the Si substrate is fed relatively at a speed of 3mm/min to allow the surface of the Si substrate to be finished with a surface roughness of 0.1 μRmax. Further, under the same condition, pulses with a pulse width of 0.5 μs were used for processing to obtain the same result. FIG. 5 is an illustration showing a method for applying grooving processing in the process of using plasma generated around a piano wire to apply scribing to the surface of a semiconductor for polishing.

[0052] As described above, in the process of polishing the surface of the Si substrate, processing for 0.15 mm deep grooving can be carried out when the electrode feeding is stopped for 5 seconds. However, in this case, the gap between the electrode and the substrate surface was made to be 0.08 mm. Further, under the same condition, pulses with a pulse width of 0.5 μs were used for processing to obtain the same result.

[0053] In the same way as described above, SiO_2, Al_2O_3, CBN, diamond, and WC can be processed individually, or composites thereof can be processed. Further, a trimethylboron layer can be formed on the surface of polytetrafluoroethylene. In this case, a processing gas containing 3% trimethylboron and Ar gas as the rest is used to subject the surface of tetrafluoroethylene to plasma processing. The thus processed surface bonded to an iron sheet with an epoxy adhesive resulted in a bond strength of 210kgf/cm^2.

[0054]

[Advantageous Effects of the Invention] In the present invention, plasma is locally generated with the use of linear electrodes or the like, and further, the plasma is controlled by a magnetic field, if necessary, and directed to act on atoms of objects to be processed to carry out various types of processing. The selection and control of the processing gas and discharge condition allows objects to be processed to be continuously subjected to removal, deposition, or diffusion processing. Therefore, the present invention has advantageous effects that the manufacturing process is significantly simplified, the cost is reduced, and the amounts used of pollution-causing materials can be substantially reduced.

[Brief Description of the Drawings]

[FIG. 1] a perspective view illustrating a configuration example of a main part of an apparatus for carrying out a plasma processing method according to the present invention

[FIG. 2] a cross-sectional view illustrating an example of a wire electrode arrangement

[FIG. 3] a cross-sectional view illustrating an example of a pinpoint electrode arrangement

[FIG. 4] an illustration showing a state in which plasma generated around a wire electrode is used to apply scribing to the surface of a semiconductor for polishing

[FIG. 5] an illustration showing a method for applying grooving processing during the processing step shown in FIG. 4

[Explanation of the Reference Numerals and Signs] 1, 1 main girder

2 cross beam

3 slide table

4, 4 electrode unit

5, 5 electrode

6, 6 electrode unit mounting column

7, 7 object to be processed

8, 8 working table

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